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some doubt as to whether the case described by Mr. Lennox can be considered an immediate effect of cross pollination, I think everyone critically examining it will admit. If due to reversion, graft hybridization or cross pollination, the same characters will probably appear on the tree again next year, so that further studies may be made. It is to be hoped that Mr. Lennox will be able to test the validity of his conclusions experimentally.

Horticultural literature has become so filled with descriptions of supposed cases of the immediate action of pollen where insufficient evidence is given to enable one to judge the merits of the case, that it behooves observers to be exceptionally careful in regard to all conditions if any final conclusions are to be reached.

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#### THE DEFINITION OF CIVIL ENGINEERING.

THERE is an error in my paper on the Artistic Element in Engineering which I should like to correct. Following the lead of other writers, I have ascribed the classic definition of civil engineering to Telford instead of to Tredgold, whom I have recently learned was its author. See *R. R. Gazette* of December 28, 1894, page 883, or of August 28, 1896, page 602.

I am indebted to Mr. H. G. Prout, of the *Gazette*, for calling my attention to the matter.

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#### SCIENTIFIC LITERATURE.

*Studies of Childhood.* JAMES SULLY. New York, D. Appleton & Co. 1896.

This book is a series of topical or classified studies of certain phases of the psychology of child life, covering, upon the whole, the period of life from two to six years of age, with quite a marked preference for those phenomena which dawn or are at their height in the second and third years. The topics covered are: The imagination of childhood; its reasonings, including a study both of the process and the more marked and characteristic processes; the beginnings of language; the emotion of fear; some phenomena of morality, including a study

of children's egoism, altruism, lies, and an account of their reactions to the moral injunctions of their elders; and a study of the child's æsthetic nature as manifested in his instinctive expressions and in his primitive drawings. The book concludes with a detailed individual study (covering about 100 pages) of one of his own children; and a very interesting study of the childhood of George Sand, drawn from the latter's autobiography. In this connection it may be remarked that a distinct feature of the book is not only the author's own style, which is literary rather than 'scientific,' but his wide acquaintance with autobiographical allusions to childhood and his apt use of such reminiscences. Ruskin, Dickens, Quinet, Tolstoi, Stevenson and many others figure in these pages.

This topical character of the treatment practically makes any synopsis of the book, beyond such a bare scheduling of headings, out of the question. An immense number of relevant observations of childhood, gathered from practically all available sources, supplemented by Mr. Sully's own observations, and enlivened by judicious remarks upon the salient qualities of childhood, make the book what it is. The hypercritical will probably conceive that the running commentary is sometimes discursive, occasionally dangerously near the padding point, and frequently of no great importance. But I confess myself sufficiently grateful in finding a book to review which is interesting to read as well as technically instructive.

The impossibility of summarizing the material content of the book makes it advisable to direct attention to the method, both what Mr. Sully himself says about method and that which he actually employs. As to the former, Mr. Sully devotes considerable space in his introduction to the objects and difficulties of child study, and to an account of the equipment necessary for observation and interpretation. The interest in child-study he finds to be partly due to the general development of natural science and partly to specifically psychological needs. The infant is, so to speak, more obviously a natural phenomenon than the adult; and the evolutionist in particular finds in him obvious signs of close kinship with the animal world, both in the foetal and early post-foetal stages. The

ethnologist also finds in the child a summary of the prehistoric development of the race. To the psychologist the opportunities of escape from the interwoven complexities of the adult consciousness make this a promised land of science. Yet the difficulty even with the reference to the outward phenomenon is very great; witness the difficulties in identifying the first smile of the child, his first sign of recognition, his first conscious attempt in any direction. And, of course, the difficulty is still greater when we come to interpret these movements into their psychical equivalents. These difficulties are so great that the author 'confesses that in spite of some recently published highly hopeful forecasts of what child-psychology is going to do for us, I think we are a long way off from a perfectly scientific account of it;' a remark to which no one will take exception if there is much emphasis upon the 'perfectly.'

There are two qualities necessary for good work. The first is the 'divining power,' sympathetic insight, tact or fineness of spiritual insight. This is required both for such rapport with children as to establish the conditions for natural, unconstrained exhibition of genuine phenomena, and for interpretation. (Mr. Sully's own work, I remark in passing, shows a very unusual amount of such native divining tact and personal sympathy). There is danger, however, that the very liveliness of this touch with child-life will take off the edge from close, objective, systematic study of the bare, cold facts. Hence the second requirement, good psychological training. Fathers, Mr. Sully thinks, are more apt to come short as regards the first of these qualifications; mothers as regards the second.

As concerns method in general most is to be expected from the prolonged observation of individual children such as is represented by the work of Preyer and Miss Shinn. Mr. Sully's remarks here are so much to the point as to justify quotation in full. 'No fact is really quite simple, and the reason why some facts look so simple is that the observer does not include in his view all the connections of the occurrence which he is inspecting. \* \* \* It is only when the whole fact is before us, in well-defined contour, that we can begin to deal with

its meaning.' And of course, this wholeness of the fact presupposes knowledge of the individual child, his environment, history, temperament, etc. When we come to older children this specific individual study may be supplemented by more general and statistical collections.

All this seems to me well and judiciously put. Mr. Sully's own work in the pages which follow bears evidence throughout that he realizes practically, as well as theoretically, the limitations, the problems and the needs of which he has been talking. Nevertheless, there are reasons for holding that this book will be to the psychologist, at least, rather 'raw materials to serve' than a contribution to psychology as such.

It is possible to go at the study of the child with the purpose of arranging the observed phenomena under the customary rubrics of psychology, laying emphasis upon extreme exhibitions of principles which are discernible only feebly or subtly in the adult, or upon the phenomenon which mark departures from the forms which are familiar in the adult consciousness. Here, however, unconsciously, *the adult consciousness as already analyzed is taken as the standard*. Another method treats the child consciousness as, if I may use the expression, perfectly good consciousness on its own account, just as good consciousness as the adult. The interest is wholly in the light which such consciousness may throw upon psychical principles in general. The aim is not to classify the phenomena under principles already accepted, but to reconstruct those principles from the study of facts hitherto neglected. Mr. Sully's actual procedure seems to me to adopt the first named course. He rarely uses the new facts to criticize and modify the customary classifications and explanations, but rather takes these latter for granted and crowds the observations under them—with some projecting edges.

As an example, we may take his theoretical treatment of imagination in childhood. After making a good beginning by remarking that "imagination in an active, constructive form takes part in the very making of what we call sense-experience," he goes on to give cases of the personification of inanimate objects in per-

ception, and takes up the argument as follows: "Now, it may be asked whether all this analogical extension of imagery to what seem to us such incongruous objects involves a vivid and illusory apprehension of these as transformed.

\* \* \* A conjectural answer can be given. In this imaginative contemplation of things the child but half observes what is present to his eyes, one or two points only of supreme interest in the visible thing, whether those of form, as in assimilating the piano-hammer to the owl, or of action as the *falling* of the leaf, being selectively alluded to, while assimilative imagination overlaying the visual impression with the image of a similar object does the rest. In this way the actual field of objects is apt to get veiled, transformed by the wizard touch of a lively fancy."

Now, from the standpoint of a certain psychology, the customary one, this is very well said. But it merely assumes, without questioning, two things which the facts discussed are well adapted to make us question: the 'actual field of objects,' 'what is present to the eyes' on one side and the imagination or fancy, as some sort of distinct power on the other. But is not this somewhat naive? Is this reference to the 'actual field of objects' anything more than making the special constructions of the adult consciousness, made from the standpoint of its supreme interests, the fixed standard? Is the problem how and why the child overlays the things present to his eyes with fanciful unrealities one of his own inner being? Or is it why and how the growing consciousness gradually shears down the original experience, inhibiting the larger part of the interests which determined it, and gradually confines itself to one or two definite ends and habits in selecting the qualities which shall constitute the world of things? In a word, is the child object the adult ('or real') object with an overplus of fanciful fringe, or is the adult-object the child-object pared down and rearranged to meet the dominant needs of mature life—one being just as 'real' as the other in an abstract or metaphysical sense?

I do not mean to affirm that Mr. Sully is wrong in choosing the former alternative. But the fact that he has adopted it without consid-

ering there is an alternative, indicates to my mind that, for the most part, he is just classifying the new scientific material under the old headings, instead of remaking the point of view.

From the standpoint of the scientific psychologist this is an important qualification regarding Mr. Sully's work. Quite probably, however, it fits the book all the better for the task of mediating between the psychologist and the public of parents and teachers into whose hands the book will fall; and, as there are many signs that this is the end the book has in view, it is a pleasure to add that it fulfills this particular purpose better than anything as yet published upon child psychology. A good index adds materially to the usability of the book.

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*The Whence and Whither of Man:* A brief history of his origin and development through conformity to environment, being the Morse lectures (at Union Theological Seminary) for 1895. By JOHN M. TYLER, Professor of Biology, Amherst College. Charles Scribner's Sons, New York. \$1.75.

The Morse lectureship was founded by Prof. S. F. B. Morse in 1865 at Union Theological Seminary, the lectures to deal with 'the relation of the Bible to any of the sciences.' These lectures for 1895, which are just published, deal with some of the most fundamental of all the relations between scientific and religious belief, and that in such a candid and fearless spirit as to at once win the attention and respect of all persons who love the truth and believe that a free expression of opinion is the best way of advancing it. The lectures include such topics as the fundamental properties of living things; a brief consideration of Classification, Ontogeny and Phylogeny; the probable course of evolution from amœba to man; the history of mental development and its sequence of functions from reflex-action to reason and altruism; natural selection and environment, making at first for digestion and reproduction preeminently, then for muscular strength and activity, then for shrewdness, finally for unselfishness and righteousness; conformity to environment; man from the biological, social and religious stand-